

What is claimed is:

- 1 1. A method of making an olefin product from an oxygenate
2 feedstock, comprising providing a silicoaluminophosphate molecular sieve having
3 catalytic sites within the molecular sieve; providing a shield to protect the
4 catalytic sites from contact with water molecules; removing the shield; and, after
5 removing the shield, contacting the sieve with an oxygenate feedstock under
6 conditions effective to produce an olefin product, wherein the activated sieve
7 contacting the oxygenate feedstock has a methanol uptake index of at least 0.15.
2. The method of claim 1, wherein the methanol uptake index is at
least 0.4.
3. The method of claim 2, wherein the methanol uptake index is at
least 0.6.
4. The method of claim 3, wherein the methanol uptake index is at
least 0.8.
5. The method of claim 1, wherein the sieve contacting the feedstock
has a methanol conversion of at least 10 wt.% at a standard time on stream of 5
minutes and a WHSV of 25 hr⁻¹.
6. The method of claim 5, wherein the sieve contacting the feedstock
has a methanol conversion of at least 15 wt.% at a standard time on stream of 5
minutes and a WHSV of 25 hr⁻¹.
7. The method of claim 6, wherein the sieve contacting the feedstock
has a methanol conversion of at least 20 wt.% at a standard time on stream of 5
minutes and a WHSV of 25 hr⁻¹.
8. The method of claim 1, wherein the sieve is maintained at a
temperature of at least 150°C prior to contacting with feedstock.
9. The method of claim 1, wherein the shield is removed ex situ.
10. The method of claim 1, wherein the shield is removed in situ.
11. The method of claim 1, wherein the shield is a template.

1 12. The method of claim 11, wherein the template is selected from the
2 group consisting of a tetraethyl ammonium salt, cyclopentylamine, aminomethyl
3 cyclohexane, piperidine, triethylamine, cyclohexylamine, tri-ethyl
4 hydroxyethylamine, morpholine, dipropylamine, pyridine, isopropylamine and
5 mixtures thereof.

13. The method of claim 11, wherein the template is removed by
contacting with an oxygen-containing gas under conditions effective to calcine the
molecular sieve.

14. The method of claim 11, wherein the template is provided with the
molecular sieve as a wet filter cake.

15. The method of claim 14, wherein the template is removed prior to
contacting the molecular sieve with oxygenate feedstock by drying the wet filter
cake to obtain a dried material, and then contacting the dried material with an
oxygen-containing gas under conditions effective to calcine the molecular sieve.

16. The method of claim 11, wherein the template is removed by
contacting with an inert gas, substantially in the absence of O₂, under conditions
effective to remove the template from the molecular sieve.

17. The method of claim 1, wherein the shield is an anhydrous gas or
liquid.

18. The method of claim 17, wherein the shield is an anhydrous gas.

19. The method of claim 18, wherein the anhydrous gas comprises a
gas selected from the group consisting of nitrogen, helium, CO, CO₂, H₂, argon,
O₂, light alkanes, and mixtures thereof.

20. The method of claim 17, wherein the shield is an anhydrous liquid.

21. The method of claim 20, wherein the anhydrous liquid is selected
from the group consisting of alkanes, cyclo-alkanes, C₆-C₃₀ aromatics, alcohols
and mixtures thereof.

22. The method of claim 20, wherein the anhydrous liquid is removed
and the molecular sieve is contacted with an oxygen-containing gas under

conditions effective to calcine the molecular sieve prior to contacting the molecular sieve with oxygenate feedstock.

23. The method of claim 1, wherein the shield is a carbonaceous material.

24. The method of claim 17, wherein the shield is provided under vacuum conditions.

25. The method of claim 1, wherein the molecular sieve has a pore size of less than 5 angstroms.

1 26. The method of claim 1, wherein the silicoaluminophosphate
2 molecular sieve is selected from the group consisting of SAPO-5, SAPO-8,
3 SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34,
4 SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44,
5 SAPO-47, SAPO-56, and metal containing forms thereof.

27. The method of claim 1, wherein the activated catalyst is contacted with the oxygenate feedstock in a reactor at a WHSV of 1 hr^{-1} to 1000 hr^{-1} .

28. The method of claim 27, wherein olefins are produced at a TCNMS of less than 0.016.

29. The method of claim 1, wherein the molecular sieve is contacted with the oxygenate feedstock at a pressure of from 0.1 kPa to 100 MPa

1 30. The method of claim 1, wherein the oxygenate feedstock is
2 selected from the group consisting of methanol; ethanol; n-propanol; isopropanol;
3 C₄-C₂₀ alcohols; methyl ethyl ether; dimethyl ether; diethyl ether; di-isopropyl
4 ether; formaldehyde; dimethyl carbonate; dimethyl ketone; acetic acid; and
5 mixtures thereof.

31. The method of claim 1, wherein the olefin product comprises ethylene, propylene, or a combination thereof.

32. The method of claim 1, wherein the silicoaluminophosphate molecular sieve is provided with a binder material.

33. The method of claim 1, wherein the olefin product is contacted with a polyolefin-forming catalyst under conditions effective to form a polyolefin.

1 34. A method of making an olefin product from an oxygenate
2 feedstock, comprising removing a template from a silicoaluminophosphate
3 molecular sieve, and contacting the molecular sieve with the oxygenate feedstock
4 under conditions effective to convert the feedstock to an olefin product before the
5 methanol uptake index drops below 0.15.

35. The method of claim 34, wherein the molecular sieve is contacted with oxygenate feedstock before the methanol uptake index drops below 0.4.

36. The method of claim 35, wherein the molecular sieve is contacted with oxygenate feedstock before the methanol uptake index drops below 0.6.

37. The method of claim 36, wherein the molecular sieve is contacted with oxygenate feedstock before the methanol uptake index drops below 0.8.

38. The method of claim 34, wherein the activated sieve contacting the feedstock has a methanol conversion of at least 10 wt.% at a standard time on stream of 5 minutes and a WHSV of 25 hr⁻¹.

39. The method of claim 38, wherein the activated sieve contacting the feedstock has a methanol conversion of at least 15 wt.% at a standard time on stream of 5 minutes and a WHSV of 25 hr⁻¹.

40. The method of claim 39, wherein the activated sieve contacting the feedstock has a methanol conversion of at least 20 wt.% at a standard time on stream of 5 minutes and a WHSV of 25 hr⁻¹.

41. The method of claim 34, wherein the activated sieve is maintained at a temperature of at least 150°C prior to contacting with feedstock.

42. The method of claim 34, wherein the template is removed ex situ.

43. The method of claim 34, wherein the template is removed in situ.

1 44. The method of claim 34, wherein the template is selected from the
2 group consisting of a tetraethyl ammonium salt, cyclopentylamine, aminomethyl

3 cyclohexane, piperidine, triethylamine, cyclohexylamine, tri-ethyl
4 hydroxyethylamine, morpholine, dipropylamine, pyridine, isopropylamine and
5 mixtures thereof.

1 45. The method of claim 34, wherein the silicoaluminophosphate
2 molecular sieve is selected from the group consisting of SAPO-5, SAPO-8,
3 SAPO-11, SAPO-16, SAPO-17, SAPO-18, SAPO-20, SAPO-31, SAPO-34,
4 SAPO-35, SAPO-36, SAPO-37, SAPO-40, SAPO-41, SAPO-42, SAPO-44,
5 SAPO-47, SAPO-56, metal containing forms thereof, and mixtures thereof.

1 46. The method of claim 34, wherein the oxygenate feedstock is
2 selected from the group consisting of methanol; ethanol; n-propanol; isopropanol;
3 C₄-C₂₀ alcohols; methyl ethyl ether; dimethyl ether; diethyl ether; di-isopropyl
4 ether; formaldehyde; dimethyl carbonate; dimethyl ketone; acetic acid; and
5 mixtures thereof.

47. The method of claim 34, wherein the silicoaluminophosphate
molecular sieve is provided with a binder material.

48. The method of claim 34, wherein the template is removed from the
molecular sieve by heating at a temperature between 200°C and 800°C.

49. The method of claim 34, wherein the molecular sieve is exposed to
the oxygenate feedstock at a temperature between 200°C and 700°C.

50. The method of claim 34, wherein the olefin product is contacted
with a polyolefin-forming catalyst under conditions effective to form a polyolefin.